Impact Area Groundwater Study Program

DRAFT

Demo 2 Soil RRA Work Plan

February 19, 2004

Prepared for:

U.S. Army Corps of Engineers
New England District
Concord, Massachusetts
for
U.S. Army / National Guard Bureau
Impact Area Groundwater Study Program
Camp Edwards, Massachusetts

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Contract No. DAHA92-01-D-0006

DISCLAIMER:

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1.0 INTRODUCTION

This Rapid Response Action (RRA) Work Plan describes interim actions being proposed by the U.S. Army/National Guard Bureau's Impact Area Groundwater Study Program (IAGWSP) to address contaminated soil at the Demo Area 2 training site (Demo 2) at Camp Edwards, located within the Massachusetts Military Reservation [MMR] (Figure 1). Demo 2 is the site of past demolition training activities that resulted in the release of explosives compounds to soil. Groundwater beneath Demo 2 is also contaminated with explosives compounds.

This work has been conducted pursuant to United States Environmental Protection Agency (USEPA) Administrative Orders (AOs) issued under the Safe Drinking Water Act (SDWA) 1-97-1019 (AO1) and 1-2000-0014 (AO3). The IAGWSP has been performing soil and groundwater investigations under the Groundwater Program at Camp Edwards since 1997 pursuant to AO1, as amended July 17, 1998.

A single groundwater contamination plume has been identified in the vicinity of Demo 2 based on compound detections in monitoring wells MW-16, MW-160, MW-161, MW-259, and MW-262 (Figure 2). To date, two explosives, hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) and octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX), have been found in the contaminant plume. Particle backtrack modeling suggests that past, and perhaps present, source(s) of this contamination are located in the central portion of the former demolition training site. Extensive soil sampling has been performed at Demo 2 and several explosives contaminants have been detected. Nearly all of the Demo 2 soil contaminants previously discovered and that still remain at the site were found in a berm. The berm, which consists of a continuous series of small soil piles, extends in a 600-foot long arc from the northern to the southern boundaries the training site (Figure 3). Other contaminants were found in association with discoveries of C4 explosive fragments in the vicinity of monitoring well MW-16 remain at the site as well.

Based on these lines of evidence, contaminated soils have been interpreted to be potential sources of groundwater contamination beneath Demo 2 and the IAGWSP proposes to conduct an RRA to remove them from the site. This RRA is being undertaken voluntarily by the IAGWSP because of the availability of the thermal treatment unit being used to treat Demo 1 soils and is not a requirement of the SDWA AOs or the Massachusetts Contingency Plan (MCP). However, concurrence from the USEPA and Massachusetts Department of Environmental Protection (MADEP) is being sought in the conduct of this RRA.

1.1 Purpose

The purpose of this RRA plan is to present the conceptual design of interim actions to remediate contaminated soil within Demo 2. Aside from source removal activities, the scope of work presented in this plan does not specifically address groundwater contamination.

The activities proposed in this document are to be considered interim source removal actions with the objective of removing soil considered to be a potential continuing source of groundwater contamination. These actions are not intended to be a final remedy for soil or groundwater at Demo 2. Site investigative work in the form of additional groundwater contaminant characterization at Demo 2 will continue and the need for additional remedial

activities will be evaluated within the context of that ongoing work (AMEC, 2003a). Results of confirmatory soil samples collected to document post-RRA site conditions will be incorporated into that evaluation. Upon completion of the post-RRA groundwater and soil investigation, IAGWSP envisions completion of a risk assessment, and if necessary, development of a feasibility study, and selection and implementation of appropriate remedial measures.

1.2 Objective and General Approach

The objective of this RRA is to reduce or eliminate potential sources of groundwater contamination within Demo 2 derived from historic training activities. To achieve the stated objective, the most effective approach will be to excavate the entire volume of soil comprising the berm, as well as, RDX- and HMX-contaminated soil in the vicinity of MW-16 and remove it from the Demo 2 site for treatment and disposal.

1.3 Organization of Work Plan

Section 2.0 includes a general discussion of the site background, including general site description, history, geology, and hydrogeology. Section 3.0 presents a description of the proposed interim removal actions. Section 4.0 provides the implementation details of the proposed interim removal actions, including site preparation, excavation, materials management, treatment, and post-excavation sampling. A conceptual implementation schedule is presented in Section 5.0.

2.0 BACKGROUND

This section summarizes the pertinent background information regarding the site and includes a brief description of the site and its usage history, summaries of site geology and hydrogeology, and a discussion of the nature of groundwater and soil contamination in the vicinity of the site.

2.1 Site Description and History

MMR is a 21,000-acre facility located in the towns of Bourne, Falmouth, Mashpee, and Sandwich in Barnstable County, Massachusetts. The Massachusetts Army National Guard (MAARNG) conducts training operations at MMR, under direction of the National Guard Bureau (NGB). Approximately 14,000-acres of MMR constitute the training ranges and Impact Area, which is known as Camp Edwards. The training ranges (including Demo 2) and Impact Area lie directly over the Sagamore Lens, a major groundwater recharge area and most productive part of the Cape Cod Aquifer.

Demo 2 is located in the northern portion of MMR within Training Area C-14 (Figure 1). The site is currently comprised of an open, unvegetated clearing surrounded by relatively densely vegetated land. A berm comprised of a linear series of small soil piles is located just beyond the tree line on the western edge of the site clearing (Figure 3). Demo 2 was used for light demolition training from the late 1970s to the late 1980s. Records indicate that explosive charges including C-4 and TNT (1,3,5-trinitrotoluene) and claymore mines were used in training exercises there. Minor amounts of metallic debris remain scattered on the surface throughout the site. This debris is presumed to be the remnants of items demolished during past training activities.

Numerous soil samples have been collected at Demo 2 (Figure 3) during several phases of the IAGWSP investigation including: Phase I (locations 13A through 13J); an emergency demolition event (DEMO2NW, and DEMO2PE1 through DEMO2PE6); the controlled detonation chamber demonstration sampling (13K through 13R); C4 discoveries (DEMO2-C4-1 through DEMO2-C4-6); and Phase IIb (133S through 133U and DEMO2T1 through DEMO2T4).

The explosive compound RDX was first detected in monitoring well MW-16S in November 2001 and has been detected at various other times and locations at low concentrations (ranging from 0.42 to 2.9 ug/L) in groundwater samples collected at, and immediately downgradient of, the Demo 2 site. Lesser concentrations of HMX have also been detected in groundwater. Detailed information regarding groundwater contamination is presented in the Final Former A, Former K, and Demo Area 2 Report (AMEC, 2002a) and the Draft Technical Team Memorandum 03-3 Demo Area 2 Additional Delineation Interim Results Report (AMEC, 2003a).

A few isolated detections of explosives compounds (RDX and HMX) have been found in soils associated with a past emergency ordnance blow-in-place (BIP) event in the eastern portion of the site (DEMO2NW in Figure 3) and an earlier discovery of bulk C4 chunks in the vicinity of MW-16 (Figure 3). Contaminated soils from both these sites were removed from Demo 2 during earlier response actions. Residual concentrations of RDX, however, remain in soils at sampling location 133T (Figure 3). Concentrations of RDX at 133T range from 150 to 580 ug/kg. Detectable concentrations of several explosives (RDX, HMX, 2A-DNT and 4A-DNT) were also found in soils collected from the soil berm (AMEC 2003a). The greatest concentrations of RDX and HMX detected in berm soils were 3,000 ug/kg and 300J ug/kg, respectively. Though no bulk explosive material was found in the berm, the presence of these compounds is consistent with the types of explosives used in past Demo 2 training exercises and expected contaminant residues produced by those activities. The configuration of the soil berm, combined with the presence of metal debris and residual explosives compounds, is also consistent with the presumption that these soils represent materials scraped from the surface of past demolition sites at Demo 2 and stockpiled as part of range maintenance activities.

2.2 Geology

The geology of western Cape Cod is comprised of glacial sediments deposited during the retreat of the Wisconsin stage of glaciation. Three extensive sedimentary units dominate the regional geology: the Buzzards Bay Moraine, the Sandwich Moraine, and the Mashpee Pitted Plain. The Buzzards Bay Moraine and the Sandwich Moraine lie along the western and northern edges of western Cape Cod, respectively. The Buzzards Bay Moraine and the Sandwich Moraine are composed of ablation till, which is unsorted material ranging from clay to boulder size that was deposited at the leading edge of two lobes of the Wisconsinian glacier. These moraines form hummocky ridges to the west and north of the Central Impact Area. The Mashpee Pitted Plain, which consists of fine to coarse-grained sands forming a broad outwash plain, lies south and east of the two moraines. Underlying the Mashpee Pitted Plain are fine-grained, glaciolacustrine sediments and basal till at the base of the unconsolidated sediments. Demo 2 is located within the Mashpee Pitted Plain near the southern limit of the Sandwich Moraine. Bedrock was encountered at a depth of 373 feet below ground surface (ft bgs) at MW-16.

2.3 Hydrogeology

A single groundwater flow system underlies western Cape Cod, including Camp Edwards. The aquifer system is unconfined (i.e., it is in equilibrium with atmospheric pressure and is recharged by infiltration from precipitation). Except on extreme slopes, surface water runoff at Camp Edwards is virtually nonexistent due to the highly permeable nature of the sand and gravel underlying the area. The high point of the water table occurs as a groundwater mound beneath the southeastern portion of Camp Edwards. At Demo 2, the groundwater flows in a north-northeasterly direction. Depth to groundwater at Demo 2 ranges typically between 130 to 140 ft bgs.

The horizontal hydraulic conductivity of the Mashpee Pitted Plain sediments is assumed to range from 125 to 350 feet per day (ft/day) based on grain size analysis (Masterson et al., 1996). Results of the Central Impact Area 72-hour pump test indicated a hydraulic conductivity of the outwash material of at least 150 ft/day (AMEC, 2003b). The horizontal hydraulic gradient beneath Demo 2 is approximately 0.003.

2.4 Fate and Transport

Because bulk explosives are not always fully consumed during the detonation process, particulates can deposit on the surface during the open detonation of explosive materials. The cumulative effect of numerous detonations over the 10-year period of active demolition training at Demo 2 may account for the presence of low levels of explosives compounds in the soil (AMEC, 2002a). The residues were likely dispersed from the open detonation sites and conceivably have been concentrated by stockpiling surface soils into the berm as part of past range maintenance. Based on findings from an earlier surface survey (AMEC, 2003a), it is not expected that there is a significant amount of bulk explosive remaining within the open cleared area of Demo 2. Though no bulk explosives were found during earlier berm excavation activities (AMEC, 2003a), the presence or absence of bulk explosive residues within the berm material is less certain due to the inherent limitations in visually inspecting these stockpiled soils.

Over time, water from individual precipitation events gradually dissolves the available explosive particulates and migrates downward through the unsaturated zone as a wetting front. The extent (thickness) of the wetting front is dependent upon the intensity and duration of the precipitation event as well as the hydraulic properties of the soil, which control how fast water moves. Some compounds, such as RDX, undergo little sorption to the soil and are rapidly transported through the soil to groundwater.

2.5 Compounds of Concern

As described above, the objective of the interim removal actions proposed in this RRA is to reduce or eliminate potential sources of groundwater contamination within Demo 2. Consequently, the focus of this RRA is on those compounds detected in groundwater that are also present in soil. To date, laboratory results have revealed two contaminants, RDX and HMX, which are common to both groundwater and soil at Demo 2. These compounds will be considered compounds of concern, or COCs, for the purposes of this work plan.

3.0 DESCRIPTION OF RESPONSE ACTIONS

To achieve the reduction or elimination of potential sources of groundwater contamination within Demo 2, the general approach of proposed interim removal actions at Demo 2 will be to excavate and remove from the site berm soils and soil in the vicinity of sampling grid 133T. This interim removal action is anticipated to reduce the available mass of explosive material serving as a source of groundwater contamination at Demo 2.

For the soil berm, selection of soils to be excavated will be defined by the physical configuration of the berm itself and not by establishing contaminant concentration cleanup goals for the COCs (i.e., RDX and HMX). Even though not all samples collected from the berm contained measurable concentrations of these explosives compounds, it is possible that, due to the inherent heterogeneity of explosives in soil, undetected residues of RDX and HMX exist in the soil. Thus, the goal of the RRA will be to remove the entire soil berm volume down to the original, pre-stockpile ground surface.

For soils in the vicinity of 133T, soil will be removed from a circular region centered on the former soil grid location and excavated to a depth of approximately one foot below ground surface. Because composite samples collected from grid 133T were derived from five discrete grid node samples and the individual concentrations in those samples is unknown, a radius of 15 feet has been selected for the excavation to extend beyond the outermost sampling points encompassing all of the 133T grid nodes.

In both cases, confirmatory soil testing for explosives will take place after excavation.

Based on the configurations and approximate dimensions of the berm and 133T excavation, the amount of soil to be excavated is estimated to be 525 cubic yards (c.y.). Because berm soils will be removed down to the original ground surface, no backfilling will be necessary as part of this response action. An evaluation of whether the 133T excavation will require backfilling will be made during a post-RRA restoration evaluation in consultation with the regulatory agencies (see Section 4.9). Based on past site investigation findings, UXO are not expected to be encountered during the removal effort.

Soils at Demo 2 have been substantially characterized for explosives, pesticides, herbicides, volatile organic compounds, semi-volatile organic compounds, and total metals. A comparison between the maximum detected concentrations of these analytes has been made with the regulatory levels in Table 1 of 40 CFR Chapter I – Part 261.24 using the 20 times rule; none of the results indicate that these soils could possibly exhibit the hazardous characteristic of toxicity. In addition, the maximum reported concentrations of RDX and HMX remaining at the site (3,000 ug/kg and 300J ug/kg, respectively) fall below the threshold for ignitability and reactivity characteristics and thus do not meet the DOT definition of an explosive. Therefore, the IAGWSP has determined that these soils do not, by definition, meet any criterion of RCRA hazardous waste.

Additional soil samples are currently being collected from the berm for analysis of total metals to supplement the characterization data of these soils in advance of the RRA effort. The results will be submitted to the regulatory agencies in advance of finalization of this plan.

Post-excavation soil data will be used to evaluate the effectiveness of the removal action and provide a basis for evaluating the need for future remediation efforts at Demo 2.

4.0 IMPLEMENTATION PLAN

Demo 2 soils are to be excavated in accordance with this RRA plan to the extent described in the preceding section. The IAGWSP currently anticipates that the excavated soil will be mechanically sifted to screen out larger diameter materials. Soil sifting may be conducted on-site with a mobile unit or at a central processing area to be established at MMR prior to Demo 2 soil removal. Processed soil will then be transported to a centralized soil treatment area at MMR pending the startup of the on-site treatment facility. Currently, it is anticipated that the location of the centralized soil treatment area is to be at the H Range, adjacent to the Demolition Area 1 site. Cobbles, organic matter (roots and stumps), and metal scrap removed from the bulk soil during the sifting process will be temporarily stockpiled. Metal separated from bulk soil will be managed for disposal in accordance with the Draft OE and Range Residue Materials Disposition Plan (ECC, approval pending). Cobbles and organic matter separated from the bulk soil will be left at, or returned to, the Demo 2 site and ultimately redistributed as part of site restoration (see Section 4.9).

Removal actions conducted under this plan will be performed in compliance with the procedures outlined in the MMR Site-Specific Health and Safety Plan (HASP) for Hazardous Waste Operations (AMEC, 2003c) and Ordnance and Explosives (OE) Disposal Support Operations, Work Plan Addendum 1 (USA, 2000). Sample collection and laboratory analysis will be performed in accordance with the provisions of the IAGWSP Draft Quality Assurance Project Plan [QAPP] (AMEC, 2003d).

4.1 Regulatory Requirements

Federal, State, and local regulatory requirements were reviewed in order to identify those requirements pertaining to this RRA. Table 1 lists the requirements potentially applicable to the scope presented in this work plan, along with the governing authority, type (e.g., chemical-specific, action specific, or location specific), and action to be taken to attain the requirement.

4.2 Mobilization

The excavation contractor will mobilize personnel and dedicated equipment to the project site. Appropriate signs will be installed to delineate the work zone and facilitate movement of personnel and vehicles around the site. The excavation areas will be marked with caution tape and signs to identify the work area. Entry into the work zone will be restricted to authorized personnel. The appropriate safety zone will be established for pertinent site activities. Work proposed in this plan will be performed under the HASP (AMEC, 2003c) established per 29 CFR 1910.120.

4.3 UXO Clearance

Though the discovery of UXO is not anticipated during excavation, intrusive UXO clearance will be conducted prior to any work occurring at the proposed excavation locations. Vegetation clearance will be required as part of this activity. UXO clearance will be performed in

accordance with the requirements prescribed in USACE EP-75-1-2 (USACE, 2000) and the contractor's global UXO/Health and Safety Plans (USA, 2000).

Intrusive UXO clearance within the excavation boundaries will initially be performed to a depth of 2 ft bgs. For the soil berm, after the first lift of soil has been excavated (i.e., soil excavated to a depth of 1 foot bgs), intrusive clearance will be performed to 3 ft below the original surface and the second lift of soil will be excavated (i.e. 1 to 2 ft below the original surface). Intrusive UXO clearance will always be performed to at least 1 ft deeper than the depth of excavation. Cleared areas will be identified using waterproof yellow caution tape. During clearance activities, only UXO qualified personnel (EOD-trained) will be allowed in the work zone unless escorted by a UXO technician. In the event it is necessary for non-UXO personnel to be in the exclusion zone, qualified UXO personnel will escort them. In addition, intrusive UXO clearance will be halted for the duration of time that non-UXO personnel are in the work zone. Special exception to this rule will be made on a case-by-case basis for task-essential non-UXO personnel. Management procedures for handling UXO and metallic debris identified during UXO clearance and other proposed activities are outlined in Section 4.6.1.

4.4 Soil Excavation

It is anticipated that soils will be excavated using heavy equipment. Equipment will be specified depending on access limitations and the volume of material to be removed. Based upon the depth limitations for UXO avoidance and clearance, UXO personnel will be on-site to monitor excavation activities. Excavation equipment will be shielded with 2.26-in minimum thickness Lexan. As described in the previous section, soil will be excavated in one-foot lifts with intrusive UXO clearance performed at least one foot deeper than the excavation at all times. Excavated material will be mechanically sifted to remove large diameter material and then the processed material will be staged for subsequent transportation to the central soil treatment area.

4.5 Dust and Erosion Control

During performance of this RRA, good work practices will be maintained to minimize the potential uncontrolled dispersal of contaminants. If necessary, hay bales and silt fencing will be placed around the site to control erosion and runoff outside the work area.

While excavating, loading, and unloading potentially contaminated materials, dust generation, if an issue, will be minimized to the extent practical using water sprays. If necessary, berm materials can be pre-wetted prior to excavation during dry periods. Air monitoring for dust will be conducted up-wind and down-wind during all excavation activities, if warranted, in accordance with approved health and safety plans. Air monitoring is further detailed in the HASP (AMEC, 2003c).

4.6 Remediation Waste Management Procedures

The management of excavated soil and debris will be conducted as described below and in accordance with the provisions of 310 CMR 40.0030.

4.6.1 UXO and Metallic Debris

UXO and Ordnance and Explosives (OE) will be handled in accordance with existing contractor UXO clearance plans and current approved site procedures. The general approach is provided herein. Initially, UXO and OE will be segregated to identify safe and unsafe items. UXO or OE that are deemed acceptable to move, as determined by the USACE UXO Safety Officer, will be transported to storage for disposal in the Contained Detonation Chamber (CDC). Should the size of the UXO or OE exceed the limitations of the CDC, the items will be placed in the ammunition supply point (ASP) storage pending final disposition. UXO or OE deemed unacceptable to move, as determined by the USACE UXO Safety Officer, will be blown-in-place (BIP). BIP sampling and excavation, if required, will be conducted in accordance with the Final Revised BIP Field Sampling and Excavation Plan (AMEC, 2002b). Once regulatory approvals are obtained, UXO and OE items will be handled in accordance with the Draft OE and Range Residue Materials Disposition Plan (ECC, approval pending).

OE scrap which does not present an explosive hazard and regular scrap (metals fragments not identifiable as originating from a munition) will also be handled in accordance with the Draft OE and Range Residue Materials Disposition Plan (ECC, approval pending) and temporarily staged at the site. Scrap materials will be placed on polyethylene sheeting thick enough to prevent debris from puncturing the plastic or other engineering controls to prevent the spread of possible contamination. The scrap pile will be covered with plastic sheeting or tarps at the close of each workday to prevent rainwater from leaching contaminants from the debris.

4.6.2 Bulk Soil

Soils generated during the RRA will be processed as described under Section 4.0. A shielded front-end loader or excavator will load stockpiled soils into the mechanical soil sifter equipped with a conveyor system and appropriate blast protection. UXO personnel will inspect the soils on the conveyors and remove OE and OE scrap. Items not removed by UXO personnel will be removed by electromagnets, which will be mounted on the conveyor.

Quality control measures will be carried out during bulk soil processing in accordance with the Soil Treatment Plan (ECC, approval pending) to ensure processed soils are “energetic free”. The UXOQCS will inspect approximately one out of every twenty loads of sifted material exiting the sifter and use a Schonstedt magnetometer to verify that no OE materials are present. If OE materials are found in any load, then material accumulated that day may be rerun through the conveyor at the discretion of the UXOQCS.

Discovered OE items will be placed on polyethylene sheeting and managed in accordance with Section 4.6.1. Screened soils will be stockpiled on and under polyethylene sheeting prior to on-site treatment. Soils will be certified by the Contractor performing the soil screening as being “energetic free” prior to transport to the on-site thermal treatment unit.

4.6.3 Transportation and Treatment

Soils certified for transport and treatment will be staged in roll-off boxes or in covered stockpiles at the site. Best Management Practices including the use of impermeable barriers (e.g., polyethylene sheeting, application of biodegradable cellulose covers, etc), site grading, hay

bales, and silt fencing, will be applied to address erosion and leaching control of temporary soil stockpiles.

Soils to be transported to the thermal treatment unit will be loaded from the staging area onto/into trucks and transported to the on-site soil treatment area. Trucks will be loaded carefully to minimize accumulation of soils on the exterior of the vehicle. Residual soils on the exterior of the trucks will be physically removed prior to the vehicle leaving the specific staging area to minimize the potential transport of contaminants from the work area. Dry decontamination by physical removal will be performed using shovels and brooms. Roll-off dumpsters and dump trucks will be covered prior to the vehicle leaving the site. Trucks transporting excavated and screened soils will use established roads within Camp Edwards and obey MMR traffic regulations.

4.7 Decontamination and Demobilization

Upon completion of excavation activities, heavy equipment having contact with contaminants will be dry decontaminated using shovels and brooms. The decontamination will take place at a central location of Demo 2. Solids generated during this process will be collected and combined with previously processed soils that are to be treated. Equipment will be removed from the site in a timely manner upon completion of excavation activities.

4.8 Post-Excavation Documentation Sampling

In order to document post-excavation soil conditions, up to 20 discrete grab samples will be collected from the upper six inches of the former berm footprint and submitted for analysis of explosives using EPA Method 8330. A single 5-point grid composite sample will be collected from the center of the 133T excavation and submitted for analysis of explosives as well. Sampling will be carried out in accordance with Standard Guide for Composite Sampling and Field Subsampling for Environmental Waste Management Activities" (ASTM, 1996) and the QAPP (AMEC, 2003d).

4.9 Restoration Plan

Site restoration activities will be conducted under the direction of the IAGWSP Natural Resources Office. Activities will include a pre-excavation inspection and habitat assessment of the subject area to document site conditions and the species present. The Natural Resource Office will then direct the site restoration accordingly.

It is currently anticipated that after completion of excavation activities, soil in the vicinity of the excavation area will be re-graded to form a natural contouring of the landscape. Should additional soil be required to restore the 133T excavation site, topsoil from the Bourne landfill will be used to supplement restoration efforts. Should bulk soils be processed at Demo 2, cobbles generated during the sifting operation and chipped organic matter will be randomly redistributed within the excavated areas to provide a nature appearance.

Prior to any site restoration, a site restoration work plan will be developed and submitted to the USEPA for their review and approval. At the completion of restoration activities, an RRA completion report will be prepared and submitted to the agencies.

5.0 IMPLEMENTATION SCHEDULE

RRA activities are planned to begin in the spring of 2004, but are contingent on approval of this RRA plan. Soil excavation is anticipated to be completed within four weeks of authorization to proceed. The proposed schedule for bulk soil processing, treatment, and disposal will be subject to coordination with other ongoing soil remediation activities at MMR.

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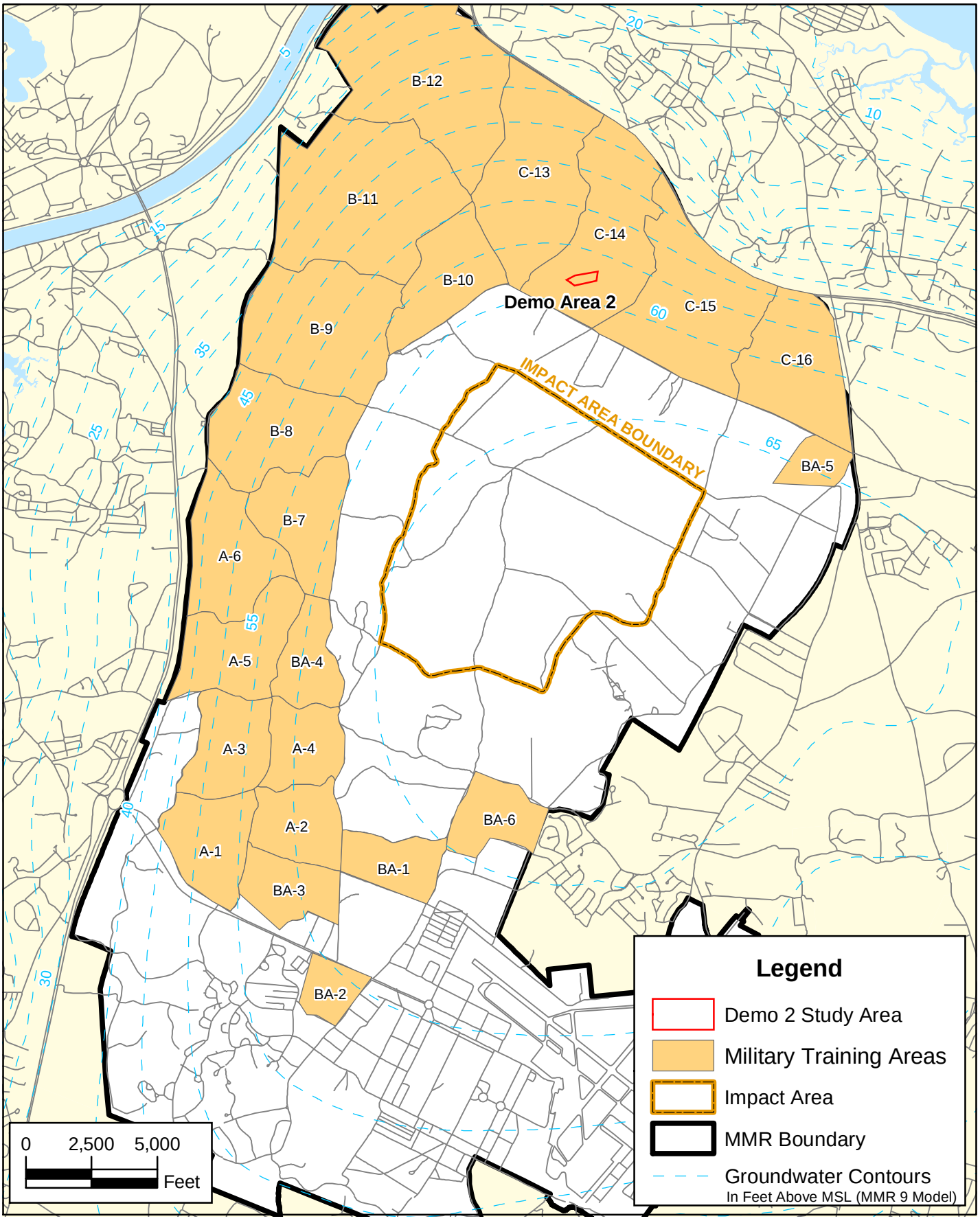

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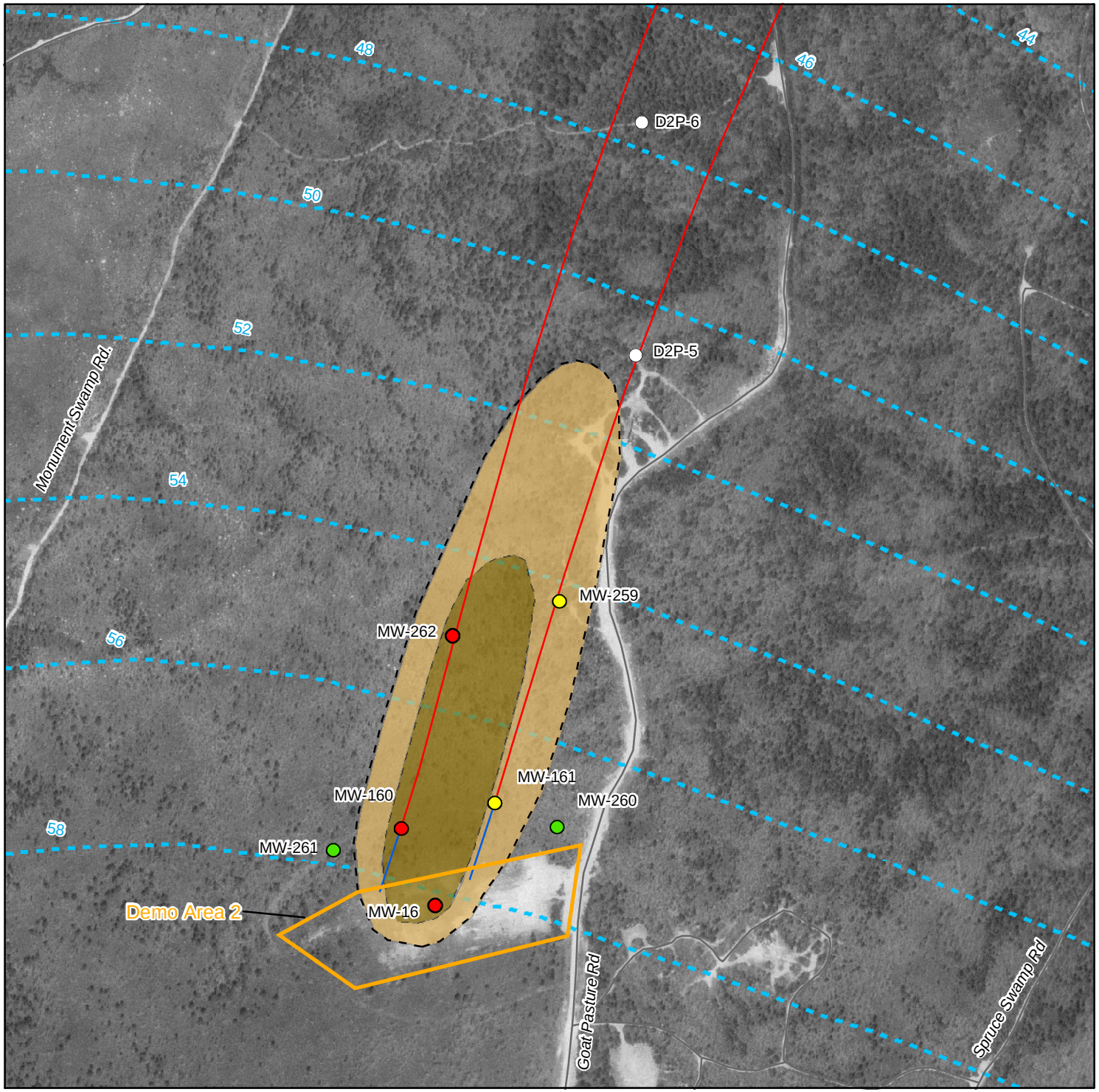
January 27, 2004 JBB

Location of Study Area

FIGURE
1

Impact Area
Groundwater Study Program



Impact Area Groundwater Study Program

LEGEND

Validated Explosives Data (8/29/03)

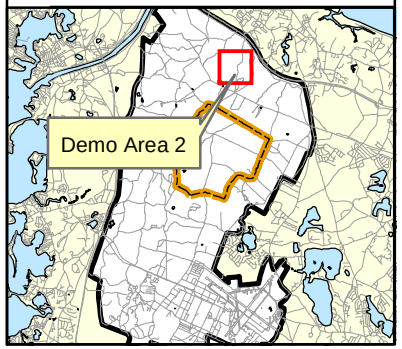
- Validated Detection Greater than or Equal to Maximum Contaminant Level/Health Advisories
- Validated Detection Less than Maximum Contaminant Level/Health Advisories
- Validated Non-Detect
- Proposed Monitoring Well
- Monitoring Well

RDX in Groundwater
(Contours Dashed Where Inferred)

- Greater than Non-Detect to 2 ppb
- Greater than 2 ppb
- Reverse Particle Track *
- Forward Particle Track *
- Groundwater Contours* (in Feet Above NGVD)

* MMR 9 Model

LOCATION MAP



NOTES & SOURCES

Basemap data from US Geological Survey 7 1/2 minute Topographic Maps. Source: MassGIS
Aerial Photos 1:5000 black and white digital orthophotos
Resolution: 0.5 meter; Date Flown: 1994
Source: MassGIS

TITLE

Demolition Area 2 Groundwater RDX Plume

0 550 Feet

N

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FIGURE 2

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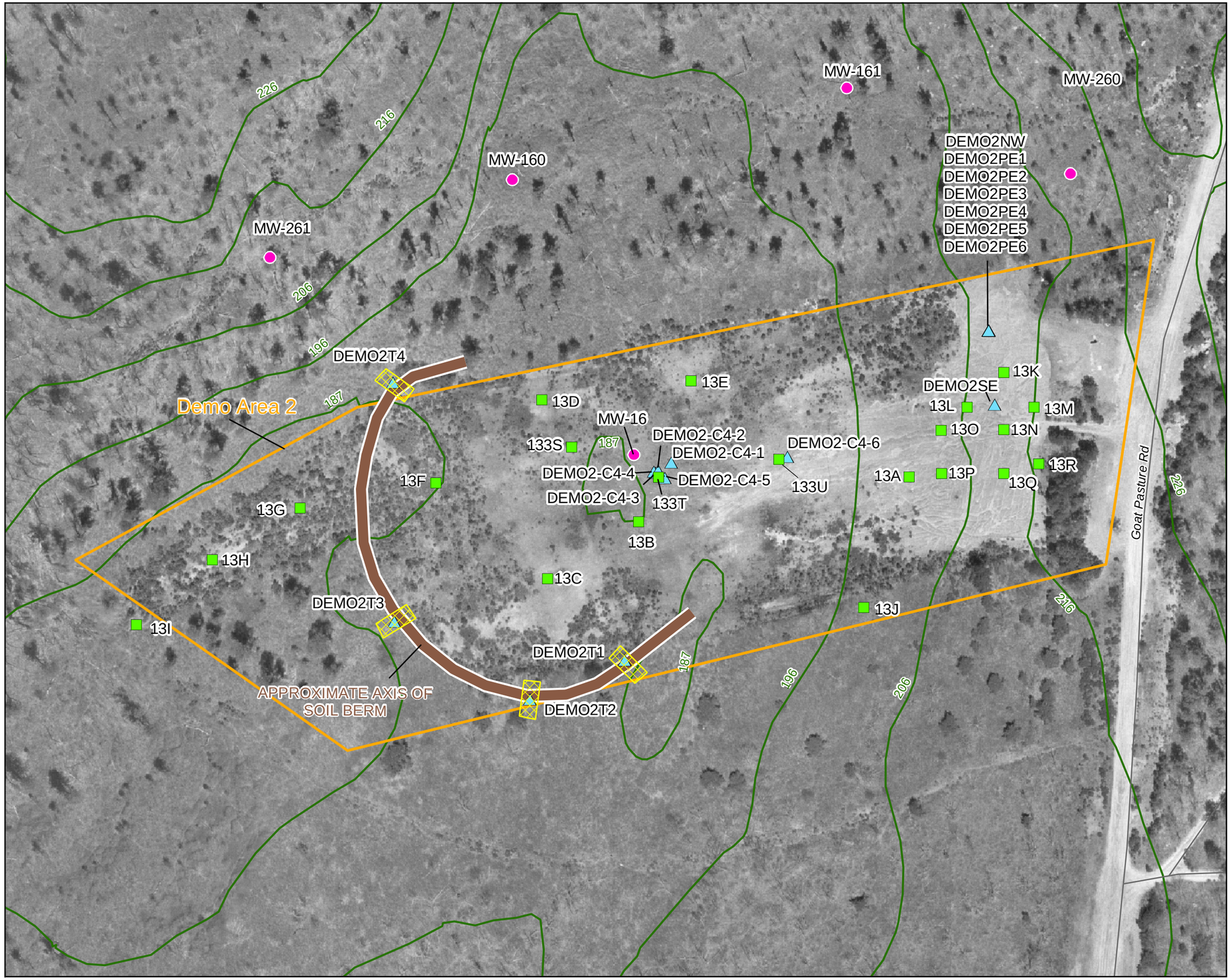
January 27, 2004 JBB



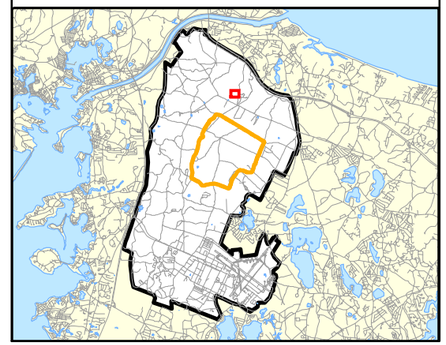
Impact Area Groundwater Study Program

LEGEND

- Monitoring Wells
- Soil Grid
- Soil Grab
- Roads
- Ground Surface Contours *
- Berm Axis
- Berm Trench

* In Feet Above Sea Level

LOCATION MAP



NOTES & SOURCES

SOURCES
Base Data from US Geological Survey 7 1/2 minute
Topographic Quads
Maps Source: MassGIS
Aerial Photos 1:5000 black and white digital orthophotos
Resolution 1 meter Date Flown 1997. Source: Jacobs Eng.

TITLE

Demolition Area 2 Sample Locations and Soil Berm Locations

0 160 Feet

N

DRAFT

AMEC Earth and Environmental, Inc.
Westford, Massachusetts

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FIGURE

3

TABLE 1
Potential Regulatory Requirements
Draft Demo Area 2 Soil Rapid Response Action Plan

AUTHORITY/ TYPE	REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal/ Action Specific	Hazardous Waste Operations and Emergency Response [29 CFR 1910.120]	Remediation activities will be subject to worker protection standards at 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response. Those regulations describe training, monitoring, planning, and other activities to protect the health of workers performing hazardous waste operations.	Worker protection standards, Hazardous Waste Operations and Emergency Response regulations will be followed to protect the health of workers. All work will comply with a Health and Safety Plan written for the soil RRA. Workers will be trained to work with hazardous materials and will have undergone medical monitoring according to the worker protection standards.
Federal/ Action Specific	Safety and Health Regulations for Construction [29 CFR 1926, Subpart P]	Regulations define safety requirements for working in excavations.	Work crews will fulfill applicable requirements, including: Confirming absence of subsurface utilities (e.g., Dig Safe); Egress from excavations greater than four feet deep; Protection from falling loads and loose rock and soil; Use of warning system for mobile equipment; Protection from cave-in for employees in an excavation (appropriate side slopes).
Federal/ Action Specific	National Environmental Policy Act of 1969 (NEPA; 42 USC 4321 et seq.) and CEQ Regulations	"EPA believes that NGB is not required to follow NEPA procedures, as long as the NGB's actions are conducted in accordance with the administrative order, because of the provision in the Council on Environmental Quality (CEQ) regulations exempting enforcement actions from	A Record of Action for each remedial action will be prepared for formal review. See further information on this process under Local/Location Specific requirements, below.

TABLE 1
Potential Regulatory Requirements
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AUTHORITY/ TYPE	REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	(4 CFR 1500-1508)	NEPA." (USEPA, 1 March 01) The Environmental Standard Operating Procedures (ESOP) Manual (AMEC, August 2001d) establishes a standard procedure for identifying and minimizing impacts to environmental resources through siting of structures, careful installation, and scheduling of construction work during future activities at MMR. This procedure was developed in consideration of the National Environmental Policy Act (NEPA; 42 USC 4321 et seq.); CEQ Regulations Implementing the Procedural Provisions of NEPA (40 CFR 1500-1508); and Army Regulation (AR) 200-2.	
State/ Chemical Specific	Massachusetts Air Pollution Control Regulations [310 CMR 6.00 – 7.00]	Construction activities could trigger Massachusetts Air Pollution Control Regulations (310 CMR 6.00 – 7.00). These regulations set emission limits necessary to attain ambient air quality standards. Specifically, 310 CMR 7.09 regulates Dust, Odor, Construction, and Demolition. 310 CMR 6.04 sets ambient air quality standards for particulate matter.	Engineering controls, such as dust suppression, will be used as necessary to prevent excessive emissions of particulate matter from excavation, handling, transportation, or storage of soil. See Section 4.5 of this document for further discussion of monitoring techniques, and suppression techniques for dust generated during excavation. As described elsewhere in this table, soil stockpiles will be covered and trucks transporting material off-site will be covered to limit dust emissions.

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AUTHORITY/ TYPE	REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State/Action Specific, Chemical Specific	Environmental Sample Collection and Analyses	Regulations specify requirements for collecting, analyzing, and documenting samples.	Samples of soil will be handled in accordance with these regulations.
State/Action Specific, Chemical Specific	Management Procedures for Remediation Waste 310 CMR 40.0030	Remediation waste shall be managed in a manner protective of human heath, public welfare and the environment. This shall include on-site storage on and cover by appropriate liner and off-site shipment with appropriate documentation. Remediation waste that is characterized hazardous shall also be regulated pursuant to 310 CMR 30.000.	Excavated material shall be handled in a manner consistent with 310 CMR 40.0030. Section 4.6 describes procedures for storing remediation waste in compliance with the MCP. In brief, all remediation waste will be placed entirely on a base composed of an impermeable material, and shall be covered daily with the same material or other suitable material so as to minimize the infiltration of precipitation, fugitive dust control, and erosion of the stockpile. Any soil taken off-site for disposal will be managed under a Bill of Lading (310 CMR 40.0035) or a Hazardous Waste Manifest, as appropriate. It will be taken off site within 120 days of generation if non-hazardous and within 90 days of generation if hazardous. Trucks transporting soil to a disposal facility via public roadways will be covered to minimize fugitive dust. Where necessary, the tires and undercarriage of each truck will be washed to minimize tracking of soil onto public roadways.

TABLE 1
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AUTHORITY/ TYPE	REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Local/Location Specific	MMR Environmental Standard Operating Procedures Manual (ESOP)	This manual outlines procedures to minimize environmental impacts through siting of structures, careful installation, and scheduling of construction work.	A Record of Action will be prepared for formal review and approval. The Record of Action will describe the environmental setting (location, habitat, vegetation, slope, etc.) and the proposed action (drilling pad, access road, vegetation removal, etc.). The Record of Action will be reviewed, as appropriate, by the Camp Edwards Natural Resources Department, Camp Edwards Cultural Resource Manager, Massachusetts Historic Preservation Office, Natural Heritage and Endangered Species Programs, Wampanoag Tribal Historic Preservation Office, Massachusetts Division of Fisheries and Wildlife, and the Bourne or Sandwich Conservation Commission if in the buffer zone of a wetland.